

Claims

1. A microwell array chip having multiple microwells on a principal surface of a substrate, said microwells being of a shape and size permitting the storage of only a single organic cell in each microwell,
wherein microwell markers are present on the same substrate surface as the openings of the microwells.
2. The microwell array chip according to claim 1, wherein said multiple microwells are arranged horizontally and vertically at identical spacing and markers are provided at a prescribed number of microwells.
3. The microwell array chip according to claim 1 or 2, wherein said multiple microwells are positioned on a principal surface of the substrate by being divided into groups each comprising a prescribed number of microwells and markers are provided in a manner permitting determination of the position of each group.
4. The microwell array chip according to claim 3, wherein the number of microwells in each group falls within a range of from 10 to 10,000.
5. The microwell array chip according to any of claims 1 to 4, wherein said marker is comprised of a fluorescent material or a reflective material.
6. The microwell array chip according to any of claims 1 to 5, wherein said marker is a positioning marker.
7. The microwell array chip according to any of claims 1 to 6, wherein said substrate is made of silicon, metal, or resin.
8. The microwell array chip according to any of claims 1 to 7, wherein the shape of said microwells is cylindrical, polyhedral comprised of multiple surfaces, inversely conical, inversely pyramidal, or a combination of two or more of the above.
9. The microwell array chip according to any of claims 1 to 8, wherein the diameter of the largest circle that can be inscribed within the planar shape of the microwells falls within a range of from 0.5 to 2-fold the diameter of the organic cell that is to be contained

in the microwells, and the depth of the microwells falls within a range of from 0.5 to 4-fold the diameter of the organic cell that is to be contained in the microwells.

10. The microwell array chip according to any of claims 1 to 9, wherein the organic cell is a lymphocyte and the microwell array chip is employed to detect single antigen-specific lymphocytes.

11. The microwell array chip according to any of claims 1 to 10, wherein a hydrophobic region is provided in a manner surrounding said multiple microwells on said principal surface.

12. The microwell array chip according to claim 11, wherein said hydrophobic region is comprised of a silicon surface or fluorine-containing surface.

13. A microwell array chip having multiple microwells on a principal surface of a substrate, said microwells being of a shape and size permitting the storage of only a single organic cell in each microwell,
wherein protrusions are present in the openings of said microwells so as to narrow said openings.

14. The microwell array chip according to claim 13, wherein said protrusions are formed by providing a film on the substrate surface that protrudes into the openings.

15. The microwell array chip according to claim 13 or 14, wherein the size of the openings formed by said protrusions permits the passage of the organic cell to be stored in the microwell.

16. The microwell array chip according to any of claims 13 to 15, wherein said substrate is made of silicon, metal, or resin.

17. The microwell array chip according to any of claims 14 to 16, wherein the film provided on said substrate surface is an oxide film, nitride film, impurity diffusion film, metal film, or resin film.

18. A method for manufacturing the microwell array chip according to claim 13 comprising the steps of:

forming a film on at least one principal surface of a substrate;
applying a resist coating on the film that has been formed;
exposing the resist surface through a mask having a microwell pattern and
removing uncured portions of resist;
etching the exposed portions of said film and substrate to fabricate wells in the
form of a microwell array; and
removing the resist.

19. The method for manufacturing a microwell array chip according to claim 18,
wherein said substrate is made of silicon, metal, or resin.

20. The method for manufacturing a microwell array chip according to claim 18 or 19,
wherein said film provided on said substrate surface is an oxide film, nitride film,
impurity diffusion film, metal film, or resin film.

21. The microwell array chip according to any of claims 13 to 20, wherein a
hydrophobic region is provided in a manner surrounding said multiple microwells on said
principal surface.

22. The microwell array chip of claim 21, wherein said hydrophobic region has a
silicon surface or fluorine-containing surface.

23. A microwell array chip made of silicon and having multiple microwells, each
microwell being used to store a single specimen organic cell,
wherein each microwell is of a size and shape holding just one organic cell.

24. The microwell array chip according to claim 23, wherein each of said microwells
is cylindrical, polyhedral comprised of multiple surfaces, inversely conical, inversely
pyramidal, or a combination of two or more of the above.

25. The microwell array chip according to claim 23 or 24, wherein the diameter of the
largest circle that can be inscribed within the planar shape of the microwells falls within a
range of from 0.5 to 2-fold the diameter of the organic cell that is to be contained in the
microwells, and the depth of the microwells falls within a range of from 0.5 to 4-fold the
diameter of the organic cell that is to be contained in the microwells.

26. The microwell array chip according to any of claims 23 to 25, wherein said organic cell is a lymphocyte and the microwell array chip is used to detect single antigen-specific lymphocytes.
27. The microwell array chip according to any of claims 23 to 26, wherein the interior surface of said microwells is coated with a fluorocarbon film or a silicon oxide film.
28. The microwell array chip according to claim 27, employed so that a single organic cell stored in a single microwell is recovered from the microwell.
29. The microwell array chip according to any of claims 23 to 28, wherein a hydrophobic region is provided in a manner surrounding said multiple microwells on said principal surface.
30. The microwell array chip according to claim 29, wherein said hydrophobic region has a silicon surface or fluorine-containing surface.
31. A microwell array chip having a microwell on a principal surface of a substrate, wherein a hydrophobic surface region is provided in a manner surrounding said microwell on said principal surface.
32. The microwell array chip according to claim 31, wherein said hydrophobic region has a silicon surface or fluorine surface.